

### **REMARKS**

Claims 1-22 are now pending in the application. Claims 8, 9, 16 and 22 are amended herein. New claim 23 is presented for consideration. Support for the amendments to claims 9, 16 and 23 appears in Paragraphs 11 and 53 and in FIG. 4. No new matter has been entered. The Examiner is respectfully requested to reconsider and withdraw the rejection(s) in view of the amendments and remarks contained herein.

### **REJECTION UNDER 35 U.S.C. § 103**

Applicants traverse the rejection of Claims 1-5, 8-13, 16-19, and 22 under 35 U.S.C. § 103 as being anticipated by Kilman et al. in view of Applicant's Admitted Prior Art (APA) and further in view of Nishiyama et al.

With respect to independent Claims 1, 9 and 16, Kilman et al. does not show, teach or suggest an electric power steering system that includes a switched reluctance machine with a segmented stator.

With respect to independent Claims 1, 9 and 16, Nishiyama et al. does not show, teach or suggest a switched reluctance electric machine or an electric power steering system. Nishiyama et al. relates to permanent magnet machines and not to switched reluctance machines.

With respect to independent claims 9 and 16 and dependent claim 23, Kilman et al does not show, teach or suggest winding wire on a stator segment to define a slot fill that is between 70 and 95%.

With respect to dependent Claims 8 and 22, neither Kilman et. al nor Nishiyama et al. show, teach or suggest a drive circuit that senses rotor position using

sensorless rotor position techniques.

In Applicant's prior response, Applicants asserted that the proposed combination of Kilman et al. and Nishiyama et al. was not obvious. Applicants identified similar, significantly older references that support the same teachings as those found in Kilman et al. and Nishiyama et al. In particular, switched reluctance motors with non-segmented stators that are similar to those taught by Kilman et al. have been around since the mid 1800's. Permanent magnet motors with segmented stators that are similar to those shown in Nishimaya et al. are shown in Sheldon (U.S. Patent No. 2,688,103, which was issued in 1952).

While the age of the references, standing alone, is not persuasive on the issue of non-obviousness, the age of the references coupled with the failure to solve the problem in light of the presumed knowledge of the references is persuasive on the issue of obviousness. As stated in **In re Neal**:

Appellant points out that the references are "quite old" and considers that an indication that this combination would not have been obvious. Such a position is not impressive "absent some showing that the art tried and failed to solve some problem notwithstanding its presumed knowledge of the references." **In re McGuire**, 57 CCPA 706, 712, 416 F.2d 1322, 1327, 163 USPQ 417, 421 (1969).

**In re Neal** 179 USPQ 56, 57 (CCPA 1973). Applicants segmented the stator of the switched reluctance machine to improve the electromagnetic characteristics of the stator segments, which makes sensorless control easier to implement. Successfully implementing sensorless control in switched reluctance machines has been a long standing problem in the art of switched reluctance machines.

Switched reluctance machines require rotor position information for control. There are two approaches that are commonly used. The sensed approach

uses a sensor that physically senses the rotor position. The sensed approach typically renders the switched reluctance machines too costly to compete with other types of machines. The increased cost of direct rotor position sensing and the failure to successfully implement less-costly sensorless rotor position sensing have been significant factors preventing the widespread sale and/or use of switched reluctance machines. Since attempts to reduce the cost of direct rotor position sensing have failed, there has been significant interest in the sensorless approach, which has the potential to reduce parts and to be less costly.

*Sensors like it is quite well known.*

Many references discuss the cost problems of direct sensing methods and the difficulty in implementing sensorless approaches. For example, Tang (U.S. Pat. No. 5,811,905) recognizes the increased cost of direct sensors (**Col. 1, lines 46-52**) and the difficulty in implementing "sensorless" rotor position techniques (**Col. 1, lines 52-60**). Kolomeitsev (U. S. Patent No. 5,777,416) also recognizes the increased cost of direct sensors (**Col. 1, line 66 to Col. 2, line 6**) and the unsatisfactory performance of sensorless rotor position techniques (**Col. 2, lines 7-13**). Liu et al. (U.S. Pat. Nos. 6,107,772) likewise recognizes the cost problems with direct sensors and the performance problems with sensorless sensing (**Col. 1, line 60 to Col. 2, line 6**). Despite the known problems relating to sensorless control techniques and the presumed knowledge of the references, no one has proposed an electric power steering system that includes a switched reluctance machine with a segmented stator as set forth in claims 1, 9 and 16.

Segmenting the stator as taught by Applicants allows the stator segments to be precisely wound. The precise winding allows the inductance and resistance

characteristics to be controlled from one stator segment to another and from one machine to another. The controlled inductance and resistance characteristics, in turn, make sensorless control systems easier to implement.

In supporting the combination, the Examiner states that it "would have been obvious to modify Kilman by making the stator segment assemblies having the shape taught by Nishiyama so that the winding may be formed easily. (Col. 4, line 49) This would have also been obvious since [segmenting the stator] is extremely common in the motor art". **Final Office Action** at paragraph 4.

There are several significant problems with the Examiner's analysis. First, Kilman et al. is directed to the problem of detecting and isolating faults in a switched reluctance machine. **See Col. 1, lines 6-11**. Kilman et al. does not even address the problem of making the stator of a switched reluctance machine easier to wind. Since  
logic? { Kilman et al. does not address this problem, it is unclear why one would look to Nishiyama et al., which relates to a different type of machine, to solve the unrecognized problem of making the stator easier to wind.

Second, the Examiner alleges that it would be obvious to segment the stator in Kilman et al. because segmenting the stator is common in the machine art. While this may be true with respect to some types of electric machines, this statement is not true with respect to switched reluctance machines. The Examiner's reasoning is exactly the type of speculation that formed the basis for reversal of the Examiner and the Board in **In re Jones**:

Evidence is  
provided by  
Nishiyama. → Conspicuously missing from this record is any evidence, other than the PTO's speculation (if it be called evidence) that one of ordinary skill in the herbicidal art would have been motivated to make the modifications of the prior art

salts necessary to arrive at the claimed 2-(2'-aminoethoxy) ethanol salt... We conclude that the PTO did not establish a prima facie case of obviousness.

In re Fine also rejected this reasoning. There, the prior art reference related to a similar device – namely gas chromatographs. Id. The prior art chromatograph detected sulfur while Applicants' chromatograph detected nitrogen. Id.

Both In re Fine and In re Jones reject the proposition that the teaching, suggestion or motivation required by §103 is present simply because the references all relate to the same broad category of art or that unsupported general knowledge of one skilled in the art can be relied upon. The Examiner is essentially asserting that it would be obvious for skilled artisans to try the features of one device in another similar device.

obv. to try  
The CAFC expressly rejected the "obvious to try theory" in In re Fine at 1598.

The sole motivation for making the proposed combination is provided by Applicants' specification, which is impermissible hindsight reconstruction. As succinctly stated by the CAFC:

But this court has said, "To imbue one of ordinary skill in the art with knowledge of the invention in suit, when no prior art reference or references of record convey or suggest that knowledge, is to fall victim to the insidious effect of a hindsight syndrome wherein that which only the inventor taught is used against its teacher." W. L. Gore , 721 F.2d at 1553, 220 USPQ at 312-13. It is essential that "the decisionmaker forget what he or she has been taught at trial about the claimed invention and cast the mind back to the time the invention was made . . . to occupy the mind of one skilled in the art who is presented only with the references, and who is normally guided by the then-accepted wisdom in the art." Id. One cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention.

In re Fine at 1600.

There are also particular advantages of Applicants' construction that are unique to switched reluctance machines. Sensorless control of brushless permanent magnet machines and induction machines currently do not operate properly if the iron core is heavily saturated with magnetic flux. Switched reluctance machines, on the other hand, are frequently operated with levels of magnetic flux in their iron cores that exceed the levels used in other types of electric machines. As set forth in claims 9, 16 and 23, the slot fill of Applicant's stator segment is between 70% and 45%. Sensorless control systems for switched reluctance machines do operate properly if the iron core is heavily saturated with magnetic flux.

By segmenting the stator and increasing slot fill of the switched reluctance machine, the diameter of the winding wire can be increased using the same number of turns. The increased diameter of the winding wire allows increased current to be driven through the windings, which increases torque output. The increased current levels also increase magnetic loading and magnetic saturation. Therefore, the benefits of a segmented stator in combination with a high slot fill (e.g. 70-95%) are unique to switched reluctance machines with sensorless drive circuits (such as those claimed in claims 9, 16 and 23).

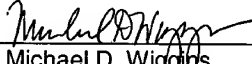
Based on the foregoing, Applicants believe that Claims 1, 9 and 16 are in condition for allowance. The remaining claims are either directly or indirectly dependent upon independent claim 1, 9 and 16 and are allowable for the same reasons.

### CONCLUSION

It is believed that all of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. Applicant therefore respectfully requests that the Examiner reconsider and withdraw all presently outstanding rejections. It is believed that a full and complete response has been made to the outstanding Office Action, and as such, the present application is in condition for allowance. Thus, prompt and favorable consideration of this amendment is respectfully requested. If the Examiner believes that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at (248) 641-1211.

Respectfully submitted,

Dated: March 3, 2003

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In re NEAL, 179 USPQ 56 (CCPA 1973)

**In re NEAL**

**(CCPA)  
179 USPQ 56**

**Decided Aug. 9, 1973**

**No. 9082**

**U.S. Court of Customs and Patent Appeals**

### Headnotes

#### PATENTS

**1. Patentability — Anticipation — Patents — Old patents (§ 51.2217)**

**Patentability — Evidence of — Delay and failure of others to produce invention (§ 51.459)**

Contention that reference patents are old is not impressive absent showing that art tried and failed to solve problem notwithstanding its presumed knowledge of references.

#### **Particular patents—Pin**

Neal, Pin, claim 1 of application refused.

#### **Case History and Disposition:**

Appeal from Board of Appeals of the Patent Office.

Application for patent of William T. Neal, Serial No. 673,155, filed Oct. 5, 1967; Patent



Office Group 333. From decision rejecting claim 1, applicant appeals. Affirmed.

**Attorneys:**

WILLIAM T. ESTABROOK and KEMON, PALMER & ESTABROOK, both of Washington, D. C. (ROBERT A. SPRAY, Indianapolis, Ind., of counsel) for appellant.

S. WM. COCHRAN (R. V. LUPO of counsel) for Commissioner of Patents.

**Judge:**

Before MARKEY, Chief Judge, RICH, BALDWIN, and LANE, Associate Judges, and ALMOND, Senior Judge.

**Opinion Text**

**Opinion By:**

BALDWIN, Judge.

This appeal is from the decision of the Patent Office Board of Appeals sustaining the examiner's rejection of the sole claim in appellant's application. <sup>1</sup>

**The Invention**

The claimed invention is a device adapted to be secured to the clothing of the wearer and to support up to some plurality of emblems in spaced relationship thereon. The nature of the device will be apparent from the claim set forth below:

1. An emblem-displaying pin device adapted to be secured onto the clothing of the wearer, comprising a supporting body-member having clothing-securing means extending rearwardly of the device and within the span of the device, and effectively concealed thereby, for securing the pin device to the wearer's clothing, said body-member being provided with a plurality of openings respectively accommodating the passing therethrough of the mounting shank of an associated badge or emblem, the said openings being of a small size in comparison to the size of the said body-member so as to be substantially inconspicuous when one or more of said openings are not receiving a said badge or emblem shank, the body-member having a smooth front face extending smoothly from outwardly of each said opening laterally to the adjacent opening and vertically to and including the periphery of said body-member, permitting the accommodation of associated badges or emblems of different sizes and of sizes whose lateral width extends farther than one-half way between adjacent ones of said openings and whose vertical height extends beyond the periphery of said body-member and yet nevertheless lie flush along the front face of said body-member.

## **The Rejection**

The claim was rejected under 35 U.S.C. 103 as unpatentable over a patent to Stupell<sup>2</sup> either taken alone or in view of a patent to Kleschka.<sup>3</sup>

Stupell relates to a pin in the form of a small bar of suitable material such as metal. The bar has a pin extending from its rear for securing it to the clothing of a wearer. It also has slot means which may be in the form of three horizontally spaced slots for receiving lugs on "ornamental or signficatory elements," such as initials, up to three of which may be displayed on its front side.

Kleschka discloses a watch fob, the fob plate of which has an opening for receiving the attaching means of an "emblematic button" such as fraternal insignia.

The examiner considered the only difference between the claimed subject matter and Stupell to be set out in the portion of the claim reading "the said openings being of a small size in comparison to the size of the said body-member so as to be substantially inconspicuous when one or more of said openings are not receiving a said badge or emblem shank." He deemed that the slots in Stupell could be considered small in comparison to the size of the body-member and felt that any opening not receiving an emblem lug, as results when only two initials are used in a three slot bar, would be inconspicuous. The examiner alternatively held that it would have been obvious to merely use small openings in the bar of Stupell and attach each emblem by means of a small lug or connecting pin which was "old

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and well known in the art as taught by Kleschka."

In affirming, the board regarded the openings in Stupell as small in comparison to the size of the body-member and did not see patentable significance in the requirement that they be substantially inconspicuous. At any rate, it considered that requirement to be met or at least rendered obvious by the apparatus disclosed in Stupell. It further considered that attaching each emblem in Stupell with a small lug or connecting pin as taught by Kleschka would have been obvious.

## **Opinion**

We are of the opinion that the rejection must be sustained under 35 U.S.C. 103 for obviousness on Stupell in view of Kleschka. We agree with the board that it would have been apparent to a person of ordinary skill in the art to modify Stupell to make the openings in Stupell of a smaller size. Such a construction would clearly meet the claim limitations including particularly the "substantially inconspicuous" requirement.

[1] Appellant points out that the references are "quite old" and considers that an indication that this combination would not have been obvious. Such a position is not impressive "absent some showing that the art tried and failed to solve some problem notwithstanding its presumed

knowledge of the references." In re McGuire, 57 CCPA 706, 712, 416 F.2d 1322, 1327, 163 USPQ 417, 421 (1969).

The decision is *affirmed*.

### **Footnotes**

Footnote 1. Serial No. 673,155, filed October 5, 1967.

Footnote 2. U. S. Patent No. 2,178,055, issued October 31, 1939.

Footnote 3. U. S. Patent No. 1,715,238, issued May 28, 1929.

**- End of Case -**



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In re Fine (CA FC) 5 USPQ2d 1596

In re Fine

U.S. Court of Appeals Federal Circuit  
5 USPQ2d 1596

Decided January 26, 1988  
No. 87-1319

### Headnotes

#### PATENTS

##### 1. Patentability/Validity -- Obviousness -- Evidence of (§ 115.0903)

Patent and Trademark Office improperly rejected claimed invention for obviousness since nothing in cited references, either alone or in combination, suggests or teaches claimed invention, since there is consequently no support for PTO's conclusion that substitution of one type of detector for another in prior art system, resulting in claimed invention, would have been obvious, and since PTO therefore failed to satisfy its burden of establishing prima facie case of obviousness by showing some objective teaching or generally available knowledge that would lead one skilled in art to combine teachings of existing references.

##### 2. Patentability/Validity -- Obviousness -- In general (§ 115.0901)

Obviousness is tested by what combined teachings of prior art references would have suggested to those of ordinary skill in art, not by whether particular combination of elements from such references might have been "obvious to try."

### **3. Patentability/Validity -- Obviousness -- Evidence of (§ 115.0903)**

Patent and Trademark Office erred, in rejecting as obvious system for detecting and measuring minute quantities of nitrogen compounds, by failing to recognize that appealed claims can be distinguished over combination of prior art references, in view of evidence demonstrating that prior art does not teach claimed temperature range, despite some overlap of preferred temperature ranges for claimed invention and prior art, since purposes of preferred temperature ranges are different and overlap is mere happenstance.

### **4. Patentability/Validity -- Obviousness -- In general (§ 115.0901)**

Dependent claims are non-obvious under 35 USC 103 if claims from which they depend are non-obvious.

## **Case History and Disposition:**

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Appeal from the U.S. Patent and Trademark Office Board of Patent Appeals and Interferences.

Application for patent by David H. Fine, Serial No. 512,374. From decision of Board of Patent Appeals and Interferences affirming rejection of application, applicant appeals. Reversed; Smith, circuit judge, dissenting with opinion.

### **Attorneys:**

Morris Relson and Darby & Darby, New York, N.Y., (Beverly B. Goodwin with them on the brief) for appellant.

Lee E. Barrett, associate solicitor, Arlington, Va., (Joseph F. Nakamura, solicitor, and Fred E. McKelvey, deputy solicitor, with him on the brief) for appellee.

### **Judge:**

Before Friedman, Smith, and Mayer, circuit judges.

## Opinion Text

### Opinion By:

Mayer, J.

David H. Fine appeals from a decision of the Board of Patent Appeals and Interferences of the United States Patent and Trademark Office (Board) affirming the rejection of certain claims of his application, Serial No. 512,374, and concluding that his invention would have been obvious to one of ordinary skill in the art and was therefore unpatentable under 35 U.S.C. §103. We reverse.

## Background

### A. The Invention.

The invention claimed is a system for detecting and measuring minute quantities of nitrogen compounds. According to Fine, the system has the ability to detect the presence of nitrogen compounds in quantities as minute as one part in one billion, and is an effective means to detect drugs and explosives, which emanate nitrogen compound vapors even when they are concealed in luggage and closed containers.

The claimed invention has three major components: (1) a gas chromatograph which separates a gaseous sample into its constituent parts; (2) a converter which converts the nitrogen compound effluent output of the chromatograph into nitric oxide in a hot, oxygen-rich environment; and (3) a detector for measuring the level of nitric oxide. The claimed invention's sensitivity is achieved by combining nitric oxide with ozone to produce nitrogen dioxide which concurrently causes a detectable luminescence. The luminescence, which is measured by a visual detector, shows the level of nitric oxide which in turn is a measure of nitrogen compounds found in the sample. The appealed claims were rejected by the Patent and Trademark Office (PTO) under 35 U.S.C. §103. Claims 60, 63, 77 and 80 were rejected as unpatentable over Eads, Patent No. 3,650,696 (Eads) in view of Warnick, et al., Patent No. 3,746,513 (Warnick). Claims 62, 68, 69, 79, 85 and 86 were rejected as unpatentable over Eads and Warnick in view of Glass, et al., Patent No. 3,207,585 (Glass).

### B. The Prior Art.

#### 1. Eads Patent.

Eads discloses a method for separating, identifying and quantitatively monitoring sulfur compounds. The Eads system is used primarily in "air pollution control work in the scientific characterization of odors from sulfur compounds."

The problem addressed by Eads is the tendency of sulfur compounds "to adhere to or react with the surface materials of the sampling and analytical equipment, and/or react with the liquid or

gaseous materials in the equipment." Because of this, the accuracy

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cy of measurement is impaired. To solve the problem, the Eads system collects an air sample containing sulfur compounds in a sulfur-free methanol solution. The liquid is inserted into a gas chromatograph which separates the various sulfur compounds. The compounds are next sent through a pyrolysis furnace where they are oxidized to form sulfur dioxide. Finally, the sulfur dioxide passes through a measuring device called a microcoulometer which uses titration cells to calculate the concentration of sulfur compounds in the sample.

## **2. Warnick Patent.**

Warnick is directed to a means for detecting the quantity of pollutants in the atmosphere. By measuring the chemiluminescence of the reaction between nitric oxide and ozone, the Warnick device can detect the concentration of nitric oxide in a sample gaseous mixture. Warnick calls for "continuously flowing" a sample gaseous mixture and a reactant containing ozone into a reaction chamber. The chemiluminescence from the resulting reaction is transmitted through a light-transmitting element to produce continuous readouts of the total amount of nitric oxide present in the sample.

## **3. Glass Patent.**

The invention disclosed in Glass is a device for "completely burning a measured amount of a substance and analyzing the combustion products." A fixed amount of a liquid petroleum sample and oxygen are supplied to a flame. The flame is then spark-ignited, causing the sample to burn. The resulting combustion products are then collected and measured, and from this measurement the hydrogen concentration in the sample is computed.

## **C. The Rejection.**

The Examiner rejected claims 60, 63, 77 and 80 because "substitution of the [nitric oxide] detector of Warnick for the sulfur detector of Eads would be an obvious consideration if interested in nitrogen compounds, and would yield the claimed invention." He further asserted that "Eads teaches the [claimed] combination of chromatograph, combustion, and detection, in that order. . . . Substitution of detectors to measure any component of interest is well within the skill of the art." In rejecting claims 62, 68, 69, 79, 85 and 86, the Examiner said, "Glass et al. teach a flame conversion means followed by a detector, and substitution of the flame conversion means of Glass et al. for the furnace of Eads would be an obvious equivalent and would yield the claimed invention." The Board affirmed the Examiner's rejection.

## **Discussion**

### **A. Standard of Review.**

Obviousness under 35 U.S.C. §103 is "a legal conclusion based on factual evidence."

*Stratoflex, Inc. v. Aeroquip Corp.*, 713 F.2d 1530, F.2d 1530, 1535, 218 USPQ 871, 876 (Fed. Cir. 1983) (quoting *Stevenson v. Int'l Trade Comm'n*, 612 F.2d 546, 549, 204 USPQ 276, 279 (CCPA 1979)). Therefore, an obviousness determination is not reviewed under the clearly erroneous standard applicable to fact findings, *Raytheon Co. v. Roper Corp.*, 724 F.2d 951, 956, 220 USPQ 592, 596 (Fed. Cir. 1983); it is "reviewed for correctness or error as a matter of law." *In re De Blauwe*, 736 F.2d 699, 703, 222 USPQ 191, 195 (Fed. Cir. 1984).

To reach a proper conclusion under §103, the decisionmaker must step backward in time and into the shoes worn by [a person having ordinary skill in the art] when the invention was unknown and just before it was made. In light of *all* the evidence, the decisionmaker must then determine whether . . . the claimed invention as a whole would have been obvious at *that* time to *that* person. 35 U.S.C. §103. The answer to that question partakes more of the nature of law than of fact, for it is an ultimate conclusion based on a foundation formed of all the probative facts. *Panduit Corp. v. Dennison Mfg. Co.*, 810 F.2d 1561, 1566, 1 USPQ2d 1593, 1595-96 (Fed. Cir. 1987).

## **B. Prima Facie Obviousness .**

Fine says the PTO has not established a *prima facie* case of obviousness. He contends the references applied by the Board and Examiner were improperly combined, using hindsight reconstruction, without evidence to support the combination and in the face of contrary teachings in the prior art. He argues that the appealed claims were rejected because the PTO thought it would have been "obvious to try" the claimed invention, an unacceptable basis for rejection. [1] We agree. The PTO has the burden under section 103 to establish a *prima facie* case of obviousness. See *In re Piasecki*, 745 F.2d 1468, 1471-72, 223 USPQ 785, 787-87 (Fed. Cir. 1984). It can satisfy this burden only by showing some objective teaching in the prior art or that knowledge generally available to one of ordinary skill in the art would lead that individual to combine the relevant teachings of the references. *In re Lalu*, 747 F.2d 703, 705, 223 USPQ 1257, 1258 (Fed. Cir. 1984); see also *Ashland Oil, Inc. v. Delta Resins & Refractories, Inc.*,

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776 F.2d 281, 297 n.24, 227 USPQ 657, 667 n.24 (Fed. Cir. 1985); *ACS Hosp. Sys., Inc. v. Montefiore Hosp.*, 732 F.2d 1572, 1577, 221 USPQ 929, 933 (Fed. Cir. 1984). This it has not done. The Board points to nothing in the cited references, either alone or in combination, suggesting or teaching Fine's invention.

The primary basis for the Board's affirmance of the Examiner's rejection was that it would have been obvious to substitute the Warnick nitric oxide detector for the Eads sulfur dioxide detector in the Eads system. The Board reiterated the Examiner's bald assertion that "substitution of one type of detector for another in the system of Eads would have been within the skill of the art," but neither of them offered any support for or explanation of this conclusion.

Eads is limited to the analysis of sulfur compounds. The particular problem addressed there is the difficulty of obtaining precise measurements of sulfur compounds because of the tendency of sulfur dioxide to adhere to or react with the sampling analytic equipment or the liquid or gaseous



materials in the equipment. It solves this problem by suggesting that the gaseous sample containing sulfur compounds be absorbed into sulfur-free methanol and then inserted into a gas chromatograph to separate the sulfur compounds.

There is no suggestion in Eads, which focuses on the unique difficulties inherent in the measurement of sulfur, to use that arrangement to detect nitrogen compounds. In fact, Eads says that the presence of nitrogen is undesirable because the concentration of the titration cell components in the sulfur detector is adversely affected by substantial amounts of nitrogen compounds in the sample. So, instead of suggesting that the system be used to detect nitrogen compounds, Eads deliberately seeks to avoid them; it warns against rather than teaches Fine's invention. See *W. L. Gore & Assoc. v. Garlock, Inc.*, 721 F.2d 1540, 1550, 220 USPQ 303, 311 (Fed. Cir. 1983) (error to find obviousness where references "diverge from and teach away from the invention at hand"). In the face of this, one skilled in the art would not be expected to combine a nitrogen-related detector with the Eads system. Accordingly, there is no suggestion to combine Eads and Warnick.

Likewise, the teachings of Warnick are inconsistent with the claimed invention, to some extent. The Warnick claims are directed to a gas stream from engine exhaust "continuously flowing the gaseous mixtures into the reaction chamber" to obtain "continuous readouts" of the amount of nitric oxide in the sample. The other words, it contemplates measuring the total amount of nitric oxide in a continuously flowing gaseous mixture of unseparated nitrogen constituents. By contrast, in Fine each nitrogen compound constituent of the gaseous sample is retained in the Chromatograph for an individual time period so that each exists in discrete, time-separated pulses. \* By this process, each constituent may be both identified by its position in time sequence, and measured. The claimed system, therefore, diverges from Warnick and teaches advantages not appreciated or contemplated by it.

Because neither Warnick nor Eads, alone or in combination, suggests the claimed invention, the Board erred in affirming the Examiner's conclusion that it would have been obvious to substitute the Warnick nitric oxide detector for the Eads sulfur dioxide detector in the Eads system. *ACS Hosp. Sys.*, 732 F.2d at 1575-77, 221 USPQ at 931-33. The Eads and Warnick references disclose, at most, that one skilled in the art might find it obvious to try the claimed invention. But whether a particular combination might be "obvious to try" is not a legitimate test of patentability. *In re Geiger*, 815 F.2d 868, 688, 2 USPQ2d 1276, 1278 (Fed. Cir. 1987); *In re Goodwin*, 576 F.2d 375, 377, 198 USPQ 1, 3 (CCPA 1978).

[2] Obviousness is tested by "what the combined teachings of the references would have suggested to those of ordinary skill in the art." *In re Keller*, 642 F.2d 413, 425, 208 USPQ 871, 881 (CCPA 1981). But it "cannot be established by combining the teachings of the prior art to produce the claimed invention, absent some teaching or suggestion supporting the combination." *ACS Hosp. Sys.*, 732 F.2d at 1577, 221 USPQ at 933. And "teachings of references can be combined *only* if there is some suggestion or incentive to do so." *Id.* Here, the prior art contains none.

Instead, the Examiner relies on hindsight in reaching his obviousness determination.

But this court has said, "To imbue one of ordinary skill in the art with knowledge of the invention in suit, when no prior art reference or references of record convey or suggest that knowledge, is to fall victim to the insidious effect of a hindsight syndrome wherein that which only the inventor taught is used against its teacher." *W. L. Gore*, 721 F.2d at 1553, 220 USPQ at 312-13. It is essential that "the decisionmaker forget what he or she has been taught at trial about the claimed invention and cast the mind back to the time the invention was made . . . to occupy the mind of one skilled in the art who is presented only with the references, and who is normally guided by the then-accepted wisdom in the art." *Id.* One cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention.

### **C. Advantage Not Appreciated by the Prior Art.**

[3] The Board erred not only in improperly combining the Eads and Warnick references but also in failing to appreciate that the appealed claims can be distinguished over that combination. A material limitation of the claimed system is that the conversion to nitric oxide occur in the range of 600°C to 1700°C. The purpose of this limitation is to prevent nitrogen from other sources, such as the air, from being converted to nitric oxide and thereby distorting the measurement of nitric oxide derived from the nitrogen compounds of the sample.

The claimed nitric oxide conversion temperature is not disclosed in Warnick. Although Eads describes a preferred temperature of 675°C to 725°C, the purpose of this range is different from that of Fine. Eads requires the 675°C to 725°C range because it affords a temperature low enough to avoid formation of unwanted sulfur trioxide, yet high enough to avoid formation of unwanted sulfides. Fine's temperature range, in contrast, does not seek to avoid the formation of sulfur compounds or even nitrogen compounds. It enables the system to break down the nitrogen compounds of the sample while avoiding the destruction of background nitrogen gas. There is a partial overlap, of course, but this is mere happenstance. Because the purposes of the two temperature ranges are entirely unrelated, Eads does not teach use of the claimed range. See *In re Geiger*, 815 F.2d at 688, 2 USPQ2d at 1278. The Board erred by concluding otherwise.

### **D. Unexpected Results.**

Because we reverse for failure to establish a *prima facie* case of obviousness, we need not reach Fine's contention that the Board failed to accord proper weight to the objective evidence of unexpected superior results. *Id.*

### **E. The "Flame" Claims.**

[4] Claims 62, 68, 69, 79, 85 and 86 relate to the oxygen-rich flame conversion means of the claimed invention. These "flame" claims depend from either apparatus claim 60 or method claim 77. Dependent claims are nonobvious under section 103 if the independent claims from which they depend are nonobvious. *Hartness Int'l, Inc. v. Simplimatic Eng'g Co.*, 819 F.2d 1100, 1108, 2 USPQ2d 1826, 1831 (Fed. Cir. 1987); *In re Abele*, 684 F.2d 902, 910, 214 USPQ 682, 689

(CCPA 1982); *see also In re Sernaker*, 702 F.2d 989, 991, 217 USPQ 1, 3 (Fed. Cir. 1983). In view of our conclusion that claims 60 and 77 are nonobvious, the dependent "flame" claims are also patentable.

### Conclusion

The Board's decision affirming the Examiner's rejection of claims 60, 62, 63, 68, 69, 77, 79, 80, 85 and 86 of Fine's application as unpatentable over the prior art under 35 U.S.C. §103 is **REVERSED**.

### Footnotes

Footnote \*. The Solicitor argues that the contents of Attachment C of Fine's brief were not before the Board and may not properly be considered here. However, we need not rely on Attachment C. It is merely illustrative of the qualitative separation of nitrogen compounds which occurs in Fine's system. The fact that the various constituents exit at discrete intervals is shown by the specification which was before the Board and which may appropriately be considered on appeal. *See, e.g., Astra-Sjuco, A.B. v. United States Int'l Trade Comm'n*, 629 F.2d 682, 686, 207 USPQ 1, 5 (CCPA 1980) (claims must be construed in light of specification).

### Dissenting Opinion Text

#### Dissent By:

Smith, circuit judge, dissenting.

I respectfully dissent. I am of the firm belief that the prior art references, relied upon by the PTO to establish its prima facie case of obviousness, in combination teach and suggest Fine's invention to one skilled in the art. Also, I firmly believe that Fine failed to rebut the PTO's prima facie case. On this basis, I would affirm the board's determination sustaining the examiner's rejection, pursuant to 35 U.S.C. §103, of Fine's claims on appeal before this court.

- End of Case -



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In re Jones (CA FC) 21 USPQ2d 1941

In re Jones

U.S. Court of Appeals Federal Circuit  
21 USPQ2d 1941

Decided February 28, 1992  
No. 91-1380

### Headnotes

#### PATENTS

**1. Patentability/Validity -- Obviousness -- Relevant prior art -- Particular inventions**  
(§ 115.0903.03)

Claimed novel salt of acid commonly known as "dicamba" is not so closely related in structure to substituted ammonium salts disclosed in prior patent as to be prima facie obvious, since claimed salt is primary amine with ether linkage, whereas diethanolamino salt disclosed in reference patent is secondary amine without ether linkage, since claimed salt is plainly acyclic or linear, whereas morpholino salt, which is only substituted ammonium salt of dicamba with ether linkage disclosed in reference patent, is cyclic in structure, and since isopropylamino salt disclosed in reference patent is primary amine, but has iso-structure quite different from that of claimed salt.

**2. Patentability/Validity -- Obviousness -- Relevant prior art -- Particular inventions**  
(§ 115.0903.03)

Claimed novel salt of acid commonly known as "dicamba" cannot be held prima facie obvious in

view of salts disclosed in prior patent, even though claimed salt is member of genus of substituted ammonium salts broadly disclosed in reference patent, since reference discloses potentially infinite genus of "substituted ammonium salts" of dicamba, and lists several such salts, but does not specifically disclose salt claimed in application, and since claimed salt is not sufficiently similar to those disclosed in reference as to render it prima facie obvious.

### **3. Patentability/Validity -- Obviousness -- Combining references    (§ 115.0905)**

Contention that one skilled in herbicidal art would have been motivated to use, with acid commonly known as "dicamba," substituted ammonium salt such as that disclosed in two prior references does not warrant holding that claimed substituted ammonium salt of dicamba for use as herbicide is prima facie obvious, since there is no suggestion for combining disclosures of those references either in references themselves, which are directed to shampoo additives and production of morpholine, respectively, or in knowledge generally available to those skilled in art.

## **Case History and Disposition:**

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Appeal from the U.S. Patent and Trademark Office, Board of Patent Appeals and Interferences.

Patent application of Rita S. Jones, Michael T. Chirchirillo and Johnny L. Burns, serial no. 07/099,279 (the 2-(2'-aminoethoxy)-ethanol salt of dicamba). From decision upholding rejection of only claim in application, applicants appeal. Reversed.

### **Attorneys:**

Melvyn M. Kassenoff, East Hanover, N.J. (Gerald D. Sharkin and Richard E. Villa, East Hanover; Joanne M. Giesser, Palo Alto, Calif., with him on brief), for appellant.

Harris A. Pitlock, associate solicitor (Fred E. McKelvey, solicitor, with him on brief; Richard E. Schafer, of counsel), for appellee.

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**Judge:**

Before Rich, Archer, and Clevenger, circuit judges.

**Opinion Text**

**Opinion By:**

Rich, J.

Rita S. Jones et al. (collectively Jones) appeal from the April 15, 1991 decision of the Patent and Trademark Office (PTO) Board of Patent Appeals and Interferences (Board), Appeal No. 90-1920, sustaining the rejection of claim 1, the only claim of application Ser. No. 07/099,279, titled "The 2-(2'-Aminoethoxy) -- Ethanol Salt of Dicamba," as unpatentable under 35 USC 103. We conclude that the PTO has not presented a *prima facie* case of obviousness, and therefore *reverse*.

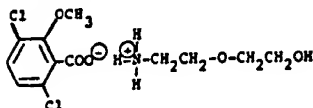
**The Invention**

The Claimed invention is a novel salt of 2-methoxy-3, 6-dichlorobenzoic acid, which acid is commonly referred to as "dicamba." A known herbicide, dicamba has typically been sold in the form of its known dimethylamine salt.

The sole claim of the application on appeal reads:

1. The 2-(2'-aminoethoxy) ethanol salt of dicamba.

The claimed salt has the following structure:



**The Rejection**

Claim 1 stands rejected as obvious in view of the combined teachings of the following references:

Richter, U.S. Patent No. 3,013,054, Dec. 12, 1961

Moyle et al., U.S. Patent No. 3,056,669, Oct. 2, 1962

Balassa, U.S. Patent No. 3,725,031, Apr. 3, 1973

Zorayan et al., 88 *Chem. Abstracts* No. 52300j, 1978

Wideman, 86 *Chem. Abstracts* No. 43711a, 1977

Richter, which all agree is the closest prior art, discloses dicamba in free acid, ester, and salt forms, for use as a herbicide. Among the salt forms disclosed are substituted ammonium salts, a

genus which admittedly encompasses the claimed salt. Richter does not specifically disclose the claimed 2-(2'-aminoethoxy) ethanol salt, however. Most notably, Richter discloses (emphasis and bracketed word ours):

Compositions in which X is substituted ammonium are amine salts of 2-methoxy-3, 6-dichlorobenzoic acid [dicamba] and are prepared by the addition of the free acid to various amines. Typical amines which can be used to prepare such amine salts are dimethylamine, trimethylamine, triethylamine, diethanolamine, triethanolamine, isopropylamine, morpholine, and the like. *The resulting products are, respectively, the dimethylamino, trimethylamino, triethylamino, diethanolamino, triethanolamino, isopropylamino, and morpholino salts of 2-methoxy-3, 6-dichlorobenzoic acid.*

Zorayan teaches the amine (H [inf 2] N (CH [inf 2] CH [inf 2] O) [inf 2] H) used to make the claimed salt, as well as the use of that amine in the preparation of surfactants for shampoos, bath preparations, and emulsifiers.

Wideman also teaches the amine disclosed in Zorayan.

The content of the remaining references is unnecessary to our decision.

The Board upheld the examiner's rejection of claim 1 as obvious, finding that the claimed 2-2'-aminoethoxy) ethanol salt of dicamba and the diethanolamine salt of dicamba specifically disclosed by Richter were "closely related in structure," and that based upon the expectation that "compounds similar in structure will have similar properties," a *prima facie* case of obviousness had arisen. The Board found that Jones' rebuttal evidence (Rule 132 declarations and data reported in the specification) failed to "compare the claimed subject matter with the closest prior art," and accordingly did not serve to rebut the *prima facie* case. This appeal followed.

### Analysis

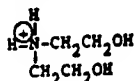
The Solicitor contends that the claimed salt falls within the genus of substituted amine salts of dicamba disclosed by Richter, and that, like Richter's genus, the claimed compound has herbicidal activity. Thus, the Solicitor urges, under the circumstances of this case, (1) the genus/species relationship and (2) the common utility of the claimed and prior art compounds support the Board's holding of *prima facie* obviousness. Moreover, the Solicitor adds, although the claimed compound is neither a homolog nor a position isomer of those salts specifically disclosed in Richter, it is structurally similar thereto, particularly the diethanolamino salt noted by the Board.

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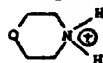
The question of "structural similarity" in chemical patent cases has generated a body of patent law unto itself. 1 Particular types or categories of structural similarity without more have, in past cases, given rise to *prima facie* obviousness; see, e.g., *In re Dillon*, 919 F.2d 688, 692-94, 16 USPQ2d 1897, 1900-02 (Fed. Cir. 1990) (tri-orthoesters and tetra-orthoesters), *cert. denied*,

\_\_\_\_ U.S. \_\_\_\_, 111 S. Ct. 1682 (1991); *In re May*, 574 F.2d 1082, 197 USPQ 601 (CCPA 1978) (stereoisomers); *In re Wilder*, 563 F.2d 457, 195 USPQ 426 (CCPA 1977) (adjacent homologs and structural isomers); *In re Hoch*, 428 F.2d 1341, 166 USPQ 406 (CCPA 1970) (acid and ethyl ester). However, none of these types of structural similarity are involved here. And in any event, this court has previously stated that generalization is to be avoided insofar as specific structures are alleged to be *prima facie* obvious one from the other. *In re Grabiak*, 769 F.2d 729, 731, 226 USPQ 870, 872 (Fed. Cir. 1985).

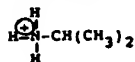
[1] On the basis of the record before us, we cannot sustain the Board's conclusion that the claimed salt and the diethanolamino salt disclosed by Richter are so "closely related in structure" as to render the former *prima facie* obvious in view of the latter. The claimed salt is a primary amine with an ether linkage. The diethanolamino salt disclosed by Richter is a secondary amine, without an ether linkage:



In addition, the only substituted ammonium salt of dicamba expressly disclosed by Richter having an ether linkage is the morpholino salt, which is *cyclic* in structure:



The claimed salt is, plainly, *a* cyclic; i.e., linear. Lastly, while the isopropylamino salt disclosed by Richter is a primary amine, as is the claimed salt, its *iso-* structure is quite different:



[2] The lack of close similarity of structure is not negated by the fact that the claimed salt is a member of Richter's broadly disclosed genus of substituted ammonium salts of dicamba. The Solicitor contends that "[t]he relative size of the genus disclosed by the prior art would not appear to be a controlling factor in determining whether a *prima facie* case of obviousness exists for a species encompassed within the described genus," citing *Merck & Co. v. Biocraft Labs., Inc.*, 874 F.2d 804, 806-09, 10 USPQ2d 1843, 1845-48 (Fed. Cir.), *cert. denied*, \_\_\_\_ U.S. \_\_\_\_, 110 S. Ct. 498 (1989). We decline to extract from *Merck* the rule that the Solicitor appears to suggest -- that regardless of how broad, a disclosure of a chemical genus renders obvious any species that happens to fall within it. In *Merck*, at issue on appeal was whether claims to a composition of two diuretics, amiloride and hydrochlorothiazide, present in a particular "medically synergistic" weight ratio, would have been obvious in view of a specific prior art disclosure of amiloride in combination with hydrochlorothiazide, one of 1200 such combinations disclosed in the prior art reference. *Id.* at 806, 10 USPQ2d at 1845. Based on the facts before it, including evidence at trial that the experimentation needed to arrive at the claimed dosage was "nothing more than routine," *Id.* at 809, 10 USPQ2d at 1847, the court affirmed the trial court's determination of obviousness. In contrast, though Richter discloses the potentially infinite genus of "substituted ammonium salts" of dicamba, and lists several such



salts, the salt claimed here is not specifically disclosed. Nor, as we have explained above, is the claimed salt sufficiently similar in structure to those specifically disclosed in Richter as to render it *prima facie* obvious. Every case, particularly those raising the issue of obviousness under section 103, must necessarily be decided upon its own facts.

[3] The Solicitor points out that, given the breadth of forms of dicamba (free acid, ester, or salt) disclosed by Richter as having herbicidal utility, one of ordinary skill in the art would appreciate that the dicamba group has significance with respect to imparting herbicidal activity to dicamba compounds. Thus, the Solicitor contends, one skilled in the art would have been motivated to use, with dicamba, substituted ammonium salts made from a known amine, such as the amine disclosed by Zorayan and Wideman, and would have expected such a salt to have herbicidal activity. Before the PTO may combine the disclosures of two or more prior art references in order to establish *prima facie* obviousness, there must be some sug

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gestion for doing so, found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. *In re Fine*, 837 F.2d 1071, 1074, 5 USPQ2d 1596, 1598-99 (Fed. Cir. 1988). We see no such suggestion in Zorayan, which is directed to shampoo additives, nor in Wideman, which teaches that the amine used to make the claimed compound is a byproduct of the production of morpholine. Nor does the broad disclosure of Richter fill the gap, for the reasons discussed above.

Conspicuously missing from this record is any *evidence*, other than the PTO's speculation (if it be called evidence) that one of ordinary skill in the herbicidal art would have been motivated to make the modifications of the prior art salts necessary to arrive at the claimed 2-(2'-aminoethoxy) ethanol salt. See *Grabiak*, 769 F.2d at 731-32, 226 USPQ at 872 ("[I]n the case before us there must be adequate support in the prior art for the [prior art] ester/ [claimed] thioester change in structure, in order to complete the PTO's *prima facie* case and shift the burden of going forward to the applicant."): *In re Lulu*, 747 F.2d 703, 705, 223 USPQ 1257, 1258 (Fed. Cir. 1984) ("The prior art must provide one of ordinary skill in the art the motivation to make the proposed molecular modifications needed to arrive at the claimed compound.")

### Conclusion

We conclude that the PTO did not establish a *prima facie* case of obviousness, and thus did not shift to Jones the burden of coming forward with unexpected results or other objective evidence of non-obviousness. Accordingly, the decision of the Board is *REVERSED*.

### Footnotes

Footnote 1. *See generally* Helmuth A. Wegner, "Prima Facie Obviousness of Chemical Compounds," 6 *Am. Pat. L. Assoc. O. J.* 271 (1978).

**- End of Case -**